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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/954,522	09/11/2001	David Hitz	103.1002.12	8740

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EXAMINER	
WASSUM, LUKE S	
ART UNIT	PAPER NUMBER

DATE MAILED: 10/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/954,522

Applicant(s)

HITZ ET AL.

Examiner

Luke S. Wassum

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Receipt of applicant's amendment, filed 22 August 2002, is acknowledged.
2. As a result of the amendment, claims 1 and 2 have been cancelled, and new claims 3-33 have been added. Claims 3-33 are now presented for examination.

Terminal Disclaimer

3. The terminal disclaimer filed on 5 September 2002 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent 5,819,292 has been reviewed and is accepted. The terminal disclaimer has been recorded.
4. The terminal disclaimer filed on 5 September 2002 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent 5,963,962 has been reviewed and is accepted. The terminal disclaimer has been recorded.
5. The terminal disclaimer filed on 5 September 2002 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent 6,289,356 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Specification

6. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

7. The disclosure is objected to because of the following informalities:

On page 7, line 19, 'done' should be 'clone'.

Appropriate correction is required.

Claim Objections

8. Claims 24 and 28-32 are objected to because of the following informalities:

All of the cited claims depend upon claims citing a memory, while themselves citing a system. Claim 24 should depend upon claim 23 instead of 13, and claims 28-32 should ultimately depend upon claim 27 instead of claim 17.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 5, 6, 15, 16, 25 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims are vague, unclear, and/or indefinite

11. Claims 5, 6, 15, 16, 25 and 26 cite the terms 'regular files' and 'special files'. On page 52, line 12 of the specification, it is disclosed that 'special files' comprise 'the inode file and the blkmap file'.

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However, the specification discloses that the instant invention comprises a multitude of inode files.

It is unclear which inode file(s) is/are included in the characterization 'special files'.

Furthermore, the examiner can find no disclosure in the specification as to what the term 'regular files' comprises.

Additionally, the last line of claims 5, 15 and 25 cite the requeueing of any dirty inodes that were not part of said consistency point. This limitation is indefinite since there is no citation of inodes having been queued, rendering a requeueing step indefinite.

12. Claims 5, 15 and 25 recite the limitation "dirty inodes" in the last line. There is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made

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in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claims 3, 4, 13, 14, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bach** ("The Design of the UNIX® Operating System") in view of **Chutani et al.** ("The Episode File System") in view of **Pike et al.** (U.S. Patent 5,623,666).

16. Regarding claims 3, 4, 13, 14, 23 and 24, **Bach** teaches a memory, system and method of maintaining data in a storage system substantially as claimed, comprising the internal representation of files in the UNIX operating system, including the maintenance of inodes and blocks (see chapter 4, pages 60-90).

Bach does not teach a memory, system and method of maintaining data wherein usage bits are maintained indicating membership in an active file system, a read-only file system, and reusability.

Chutani et al., however, teaches a memory, system and method of maintaining data wherein usage bits are maintained indicating membership in an active file system, a read-only file system, and reusability (see page 44, fourth full paragraph; see also page 46, seventh paragraph; see also Figures 1 and 2; see also the disclosure that an anode is analogous to an inode in a UNIX system, page 45, first full paragraph).

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It would have been obvious to one of ordinary skill in the art at the time of the invention to maintain a record of changes in the storage system, i.e. a fileset clone, since such a feature would be very important to the administrative operators' implementation, since the administrative tools could operate on the clones instead of on the read-write data for their work, greatly reducing the amount of time they require exclusive access to the read-write data (see page 44, fourth full paragraph).

Neither **Bach** nor **Chutani et al.** teaches a memory, system and method of maintaining data wherein the storage system is capable of storing multiple read-only copies of a file system.

Pike et al., however, teaches a memory, system and method of maintaining data wherein the storage system is capable of storing multiple read-only copies of a file system (see col. 6, line 48 through col. 7, line 5).

It would have been obvious to one of ordinary skill in the art at the time of the invention since this scheme permits the recovery or comparison of lost files by traditional commands such as file copy and comparison rather than by special utilities in a backup subsystem (see col. 6, lines 59-67).

17. Claims 7-10, 17-20, 27-30 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bach** ("The Design of the UNIX® Operating System") in view of **Chutani et al.** ("The Episode File System").

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18. Regarding claims 7-10, 17-20, 27-30 and 33, **Bach** teaches a memory, system and method of maintaining data in a storage system substantially as claimed, comprising the internal representation of files in the UNIX operating system, including a root node and inodes for a file system (see Figures 4.6 and 4.10, on pages 69 and 73 respectively), the root node pointing directly or indirectly to the inodes, each inode storing file data, pointing to one or more blocks in the storage system that store file data, or pointing to other inodes (see definition of inodes, pages 61-63, including Figure 4.2; see also discussion of direct and indirect blocks in the file system, pages 68-72, including Figure 4.6).

Bach does not teach a memory, system and method of maintaining data wherein modified or new data is written to new blocks and inodes in the storage system, with the old blocks and inodes being maintained, so that a record of changes to the file system is automatically maintained in the storage system.

Chutani et al., however, teaches a memory, system and method of maintaining data wherein modified or new data is written to new blocks and inodes in the storage system, with the old blocks and inodes being maintained, so that a record of changes to the file system is automatically maintained in the storage system (see page 44, fourth full paragraph; see also page 46, seventh paragraph; see also Figures 1 and 2; see also the disclosure that an anode is analogous to an inode in a UNIX system, page 45, first full paragraph), utilizing a list of dirty inodes (see discussion of the log container, page 46, fourth paragraph), comprising the step of creating a snapshot by copying the root node (see page 46, seventh paragraph).

It would have been obvious to one of ordinary skill in the art at the time of the invention to maintain a record of changes in the storage system, i.e. a fileset clone, since such a feature would be very important to the administrative operators' implementation, since the administrative tools could operate on the clones instead of on the read-write data for their work, greatly reducing the amount of time they require exclusive access to the read-write data (see page 44, fourth full paragraph).

19. Claims 11, 21 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bach** ("The Design of the UNIX® Operating System") in view of **Chutani et al.** ("The Episode File System") as applied to claims 7-10, 17-20, 27-30 and 33 above, and further in view of **Raz** (U.S. Patent 5,701,480).

20. Regarding claims 11, 21 and 31, **Bach** and **Chutani et al.** teach a memory, system and method of maintaining data in a storage system substantially as claimed.

Neither **Bach** nor **Chutani et al.** explicitly teaches a memory, system and method of maintaining data in a storage system wherein the block map indicates membership of blocks in one or more snapshots.

However, **Raz** teaches a memory, system and method of maintaining data in a storage system wherein the block map indicates membership of blocks in one or more snapshots (see discussion of the snapshot pages, col. 61, line 7 through col. 62, line 2, and particularly col. 61, lines 39-46; see also Figures 23 and 26).

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It would have been obvious to one of ordinary skill in the art at the time of the invention to maintain information on the membership of blocks in one or more snapshots, since this provides a way for the system to identify the snapshot records necessary to carry out operations for which the live version is not the proper version (see col. 60, lines 31-51).

21. Claims 12, 22 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bach** ("The Design of the UNIX® Operating System") in view of **Chutani et al.** ("The Episode File System") as applied to claims 7-10, 17-20, 27-30 and 33 above, and further in view of Applicants' **Admitted Prior Art**.

22. Regarding claims 12, 22 and 32, **Bach** and **Chutani et al.** teach a memory, system and method of maintaining data in a storage system substantially as claimed.

Neither **Bach** nor **Chutani et al.** explicitly teaches a memory, system and method of maintaining data in a storage system further comprising the step of deleting a snapshot from the storage system wherein blocks that are only part of the deleted snapshot are released for re-use by the storage system.

However, Applicants' **Admitted Prior Art** teaches that the fileset clone, analogous to the claimed snapshot, is deleted when the backup has completed (see specification at page 7, lines 9-22).

It would have been obvious to one of ordinary skill in the art at the time of the invention to delete snapshots from the storage system and release the freed blocks to the storage system for

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reuse, since the Episode file system only has the capability to store a single fileset clone (specification, page 7, lines 9-22), and without the capacity to delete said clone and release the blocks for reuse, the system could only perform a clone/backup operation once, and never again, which would render the fileset cloning feature irrelevant.

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Campbell (U.S. Patent 5,182,805) teaches a method of determining a copy-on-write condition in a UNIX process which includes providing a page table with an entry identifying a memory page location and providing the entry with a copy-on-write bit.

IBM ("Microkernel Extension for Cloning") teaches a file system feature of cloning, which uses copy-on-write to prevent having to make a full physical copy.

Hitz et al. ("File System Design for an NFS File Server Appliance") teaches the Write Anywhere File Layout (WAFL).

Hitz ("An NFS File Server Appliance") teaches the Network Appliance product FAServer.

Mulqueen ("Start-Up to Ship UNIX File Server that Simplifies Setup and Maintenance") teaches the release of the FAServer and its features.

Paul ("FAServer File Server Cuts Costs of UNIX File Services") teaches the release of the FAServer and its features.

Hitz et al. ("Using UNIX as One Component of a Lightweight Distributed Kernel for Multiprocessor File Servers") teaches the development of a high performance NFS file server.

Schwartz et al. ("LFS – A Local File System for Multiprocessor NFS Network Servers") teaches the file system of a new NFS server, the Auspex NS 5000.

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24. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luke S. Wassum whose telephone number is 703-305-5706. The examiner can normally be reached on Monday-Friday 8:30-5:30, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Breene can be reached on 703-305-9790. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.


In addition, INFORMAL or DRAFT communications may be faxed directly to the examiner at 703-746-5658.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.



Luke S. Wassum
Art Unit 2177

lsw
October 3, 2002



JEAN R. HOMERE
PRIMARY EXAMINER